CAiCE

WASHINGTON DEPARTMENT OF TRANSPORTATION

COMPUTER AIDED ENGINEERING SUPPORT

Application Overview

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WASHINGTON STATE DEPARTMENTOF TRANSPORTATION CAE SUPPORT

CAiCE Application Overview

This manual was created by the WSDOT CAE Training **C**oordinator **A**ction **T**eam (CAT), which is a subgroup of WSDOT CAE Support. Portions of this manual were duplicated from the On-Line Help and On-Line CAiCE Manual with permission from the CAiCE Software Corporation.

Any questions pertaining to the manual or the reproduction of the manual should be directed to the WSDOT HQ CAE staff at 1-360-407-0878.

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APPLICATION OVERVIEW

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Module Objectives

AFTER SUCCESSFUL COMPLETION OF THIS MODULE, THE STUDENT WILL BE ABLE TO:

- Identify the three main disciplines in WSDOT that utilize CAiCE and what each uses CAiCE for.
- Open CAiCE with up-to-date WSDOT resources.
- Define the four main components of the CAiCE application window.
- List three major data management components of a CAiCE project.

This module will introduce the CAiCE application and basic components; it assumes basic knowledge of Windows desktop functions, roadway design, and the following manuals:

WSDOT Design Manual
Standard Plans
Standard Specifications
Plans Preparation Manual

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Using This Manual

USING THE MOUSE

Mouse functions will be indicated with the following conventions:

Click	Press and release (click) the left mouse button once
Double-click	Click the left mouse button twice in rapid succession.
Right-click	Press and release the right mouse button.
Drag	Move the mouse while holding down the left mouse button.
Highlight	Drag the mouse pointer across data, causing the information to appear in reverse video.
Point	Position the mouse on the indicated item.

USING THE KEYBOARD

Keys that do not produce a character appear within angle brackets:

Pointer movement Keys:	**<Home>**, **<PgUp>**, **<PgDn>**, **<End>**, **<Tab>**, and the arrow keys
Other Keys:	**<Backspace>**, **<Del>**, **<Ins>**, **<Esc>**, **<Caps Lock>**, and **<Enter>**

TERMS

The following terms are used in the Manual:

Bold Print *with* **=>**	Indicates a path through a pull down menu or command structure, i.e. **View => Points**
Turn on/Turn off	Indicates an item you click on to toggle on or off. For example; *Turn on* the Enable Undo check box.
Italicized Print	Indicates something you type in. Example: Type
Bold Print	Indicates words or phrases that appear on the computer screen, references to text or a number as itself, or terms that are being defined.
Bold Italics	Indicates a folder or file name

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Chapter

1

What is CAiCE and What Do We Do With It?

WHAT IS CAICE

CAiCE is a software application geared toward civil engineering roadway design. The name CAiCE stands for **C**omputer **Ai**ded **C**ivil **E**ngineering. Within the application suite are several "Visual" modules - each covering specific design functions.

These modules include:

- Visual CAD – functions as the module manager and main interface.
- Visual Survey – provides tools for survey data processing
- Visual DTM – manages Digital Terrain Models and contours
- Visual COGO – including geometric object tools
- Visual Roads - develops proposed roadway section templates.
- Visual Site – provides tools to generate detention ponds, etc.

Visual Basic for Applications (VBA) has been incorporated for developing and running customizable macros and reports.

CAiCE provides the environment and database structure that is specifically designed for taking a civil engineering project through all phases of development and is used by surveyors, designers, and construction engineers in organizations of all types.

WSDOT selected CAiCE as the statewide roadway design software in 1997 (replacing the CEAL application) to compliment MicroStation (our drafting software). WSDOT CAE support staff has developed custom resource files and training material for our organization's CAiCE implementation. These resources will be discussed later in this module.

With CAiCE as our roadway design application and Bentley MicroStation as our drafting software, we are able to evaluate, design, present, and construct our projects with total data control and standardized, effective plan sets.

CAICE IN WSDOT

CAiCE has several applications at WSDOT. Surveyors use CAiCE to analyze original ground (surveyed and photogrammetric) data and create digital terrain models (DTMs). Designers use CAiCE to analyze and design their projects. Engineers in construction project offices use CAiCE for quantity comparisons, design checks and pay estimates.

Within each WSDOT CAiCE project, there are ten basic aspects of design. Refer to the applicable WSDOT CAE training module(s) for a more detailed description of these functions.

Importing the original ground survey chains and points from the survey crew or Photogrammetry using Visual Survey tools.

Entering of the right of way alignments and right of way boundaries using Visual COGO.

Plan view layout of design features such as horizontal alignments and offset geometry (such as lane lines) using Visual COGO.

Store and manipulate vertical profiles for alignments and other design features.

Develop and analyze hydraulics models for drainage design and impact assessment using Visual Drainage.

Create and modify superelevations for use with alignments to control their cross slopes.

Creating cross-sections for both original ground and proposed surfaces.

Calculating earthwork & surfacing volumes and slope stake notes from the finished cross-sections.

Construct and maintain original and finished ground DTMs for design processes, quantities, and contour grading plans. Merging the existing and finished cross-section files produces these finished ground DTMs.

Exporting to MicroStation for construction plan set development.

THE RIGHT TOOL FOR THE JOB

Before we go any further, let's talk about whether CAiCE is the right tool for the job.

Envision a designer's workspace. It should include all the tools necessary to design a WSDOT project. This may include paper, pencils, a calculator, Microsoft Office (Word, Excel) or an equivalent, CAiCE, MicroStation, the appropriate manuals, among other resources.

The last thing we want to do is pick a tool and make the task fit that tool. Instead, we should look at the task and find the right tool to accomplish that task. In some cases, such as a minor paver or overlay project, CAiCE may be more muscle than is necessary.

If a vicinity map, a roadway section, and some special provisions will get the job done then let's not over complicate the project.

If you are looking for a higher level of detail, comprehensive project quantities, highway geometry modifications, intersection design, ramp widening, and /or structures design, CAiCE may be more suited to your project.

WSDOT CAICE TRAINING AND SUPPORT

CAE

The WSDOT CAiCE environment is supported by an internal WSDOT structure comprised of both regional and Headquarters level support coordinators as well as programming support. This group, coupled with a similar structure for MicroStation, is called WSDOT Computer Aided Engineering (CAE) Support

WSDOT CAiCE and MicroStation Coordinators work together to develop and maintain resources, training, and support that address regional and statewide practices and standards. They coordinate efforts to maintain consistency throughout the state for all CAE users.

TRAINING

This training program uses a modular system to enable additions to the core material without the need to re-publish the entire manual. Also, these modules can be combined to develop general process classes for formal training, or utilized individually for focused self-paced or just-in-time training.

Here is a listing of modules in the WSDOT CAiCE Training curriculum:

Application Overview
WSDOT CAiCE Projects
WSDOT Resources
Data Import / Export
Coordinate Geometry (COGO)
Processing Survey Data
Digital Terrain Models
Cross-Sections
Vertical Profiles
Superelevations
Visual Roads – Fragments
Quantities in CAiCE
State Plane to Project Datum Conversion
Plotting
Intersection Design
Macros and other WSDOT specific tools
Command History

Potential courses (characters in parenthesis indicate WSDOT ATMS course codes):

Introduction to CAiCE (BRB)
Survey Data Processing (BQU)
Roadway Design in CAiCE (BQT)
Advanced CAiCE
Minor Cut and Fill Projects

This list includes modules that may not have been written yet, but gives you an idea of where the WSDOT CAiCE training program is going. Please check out our website:

www.wsdot.wa.gov/eesc/cae/CAiCE/training

Or contact your regional CAiCE Coordinator for available modules.

Other courses provided by WSDOT that we recommend are:

Technical Mathematics II (A7J) – self paced
Contract Plans Reading Course – self paced

Roadway Geometrics (BWE)
Contract Plans & Estimate Preparation (A4J)
Design Documentation (BZ8)
Managing Project Delivery (B71)
Roadside Safety (B74)

SUPPORT

What do you do when a process does not go as expected? There are many resources available for getting help with CAiCE.

We like to think of the help resource environment as a multi-level "ladder". This approach allows you to first attempt to solve the issue locally then work up the ladder to higher levels of support. Not only do you fix the problem, you may learn more about the application along the way.

When troubleshooting or addressing a problem issue with CAiCE, you should use the most local, "lowest rung of the ladder" first, then progress to the higher levels of support.

Let's start with the most local resources available and work to the highest:

"What's this?"

If you need help with a specific dialog box field, you can right-click on the label for that field and select "What's this?" It will give a brief description of what the field is asking for and in some cases, how it behaves.

Help

When you are not sure of what the dialog box will do for you or are looking for an overall description of the dialog commands, click on the dialog box **Help** button. The CAiCE help utility will give an overview of the dialog usage, and a breakdown of each of the inputs and controls.

CAiCE Online Manual

If the problem relates to basic CAiCE operation, check out the CAiCE Online Manual.

This document is available in the WSDOT environment from two locations.

In Windows:

Select ***Start*** => ***Programs*** => ***Engineering Applications*** => ***CAiCE*** => ***CAiCE Online Manual***

In CAiCE:

Select ***Tools*** => ***Custom Tools*** => ***CAiCE Online Manual.***

WSDOT Training Modules

These modules cover the WSDOT environment and general processes. If you are having a problem understanding a concept or procedure, look here.

Peer-to-peer / Office level experts

Your co-worker/supervisor may have the answer to your question. Communication between team members is essential.

WSDOT CAE Website

The WSDOT CAE website is an excellent resource for current news and information.

http://www.wsdot.wa.gov/eesc/cae

Available training courses, application upgrade schedules, contacts, resources, and feedback are all available via this site.

Tech notes are also available. These helpful tips have been developed to address frequently asked questions or particularly involved WSDOT specific tasks; such as importing photogrammetry data, or adding feature code labels to endarea plots.

CAiCE Frequently Asked Questions (FAQs)

The CAiCE website contains a growing number of FAQs. This is a great way of finding solutions to questions posted by other users. For instructions, go to http://www.wsdot.wa.gov/eesc/cae/CAiCE/TechNotes and look for CAiCE FAQs.

Regional CAiCE Coordinator

If you go through the above levels of support and still can't find the answer, then contact your regional CAiCE Support Coordinator.

Typically, this level of support is responsible for regional training, support, installs, upgrades, and utilities. A majority of support issues are resolved at this level.

Coordinators from all regions work together to develop and maintain statewide resources, training, support, and solutions.

Headquarters CAiCE Coordinator

If your regional CAiCE Coordinator cannot be reached, the highest level of WSDOT support would be from Headquarters. HQ Coordinators commonly work between the regional coordinators and the vendors.

It is typically more effective to have WSDOT CAiCE Support staff communicate issues with the vendor. CAE has specific communication channels that allow us to address issues more directly than a single user.

Chapter

2

The CAiCE Environment

In this chapter, we will talk about opening the CAiCE application, getting around and identifying the basic components of the interface, projects, and environment resources.

STARTING CAICE

To open the CAiCE application, either click on the **WSDOT CAiCE** icon found on the desktop, or click the **Start** button on the Windows task bar and select ***Programs*** => ***Engineering Applications*** => ***CAiCE*** => ***CAiCE PE***.

This actually initiates the **WSDOT CAiCE** startup utility. The **WSDOT CAiCE** startup utility checks your computer for the latest resources. If you do not have the latest WSDOT resources, this utility will update your computer before you open the application.

Figure **AO2-1**: WSDOT CAiCE resources are checked every time the desktop icon is selected.

The first time you log in and open CAiCE on a machine, you will be asked if you want the WSDOT custom toolbars or the default toolbars that come with the application. You may select any option. However, unless you have your own set of custom toolbars that you wish to use later, it is recommended that you select the WSDOT custom toolbars.

Once the resources have been checked, the **WSDOT CAiCE** dialog is displayed.

Here you can choose which text editor to have CAiCE use as default and which fragment library you want to use for the roadway design process.

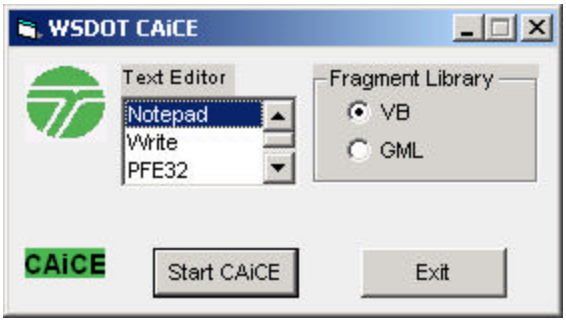

Figure **AO2-2**: WSDOT CAiCE startup dialog.

CAiCE generates output reports in the form of ASCII text files. By default, the text editor is Windows Notepad. This dialog allows you to choose a listed alternative that may work better for you. We have found other editors with more robust options.

Until you start manipulating these reports, you may accept **Notepad** as the default editor.

WSDOT CAE has two fragment libraries available for the roadway template design process in CAiCE:

> **GML** - Geometric Modeling Language (GML) is the language used to develop our previous and first fragment library. This library was in use from 1997 to 2002. It should be utilized while working on existing projects that were designed with this library. It should not be used for new projects.
>
> **VB** - Visual Basic (VB) is the language for our current fragment library. There are many advantages to this library including faster processing, and smarter, more flexible fragments.

It is not critical to choose a fragment library unless you are planning on designing roadway templates in this session. Otherwise, you can ignore this choice. More information can be found in the Visual Roads – Fragments module.

Clicking on **Start CAiCE** will first set up the WSDOT environment and then open CAiCE.

Note that the Start CAiCE button is disabled once you click on it. This prevents multiple sessions to be opened at the same time. Although clicking on the desktop icon again will open another instance

It is recommended that you click on the desktop icon in the morning to check resources, and then open CAiCE using the **WSDOT CAiCE** dialog throughout the day. This will minimize the number of times you check resources through the day. In remote areas, this could save quite a lot of time.

PROJECT DATABASE UTILITY TOOL

Prior to starting work in CAiCE, the **Project Database Utility Tools** dialog is displayed. This dialog provides tools to compact and enlarge the active project. If the project becomes congested due to frequent deletions from the database, this command can compact the deleted space to fit more points. If the initial project size was set too small, this utility allows you to set a new maximum number of points and chains for the project.

NOTE: It is recommended that an archive be made prior to running any of the utilities in this dialog. Additionally after the utility is run, another archive should be made because of the database changes.

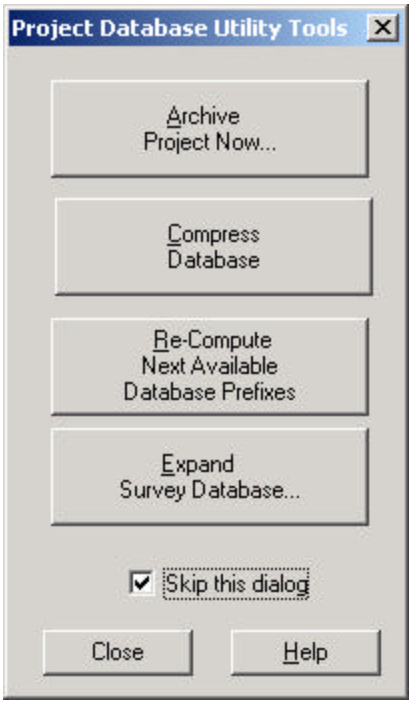

Figure **AO2-3**: The Project Database Utility Tools dialog.

The Project Database Utility Tool dialog provides the following controls:

Archive Project Now… button will invoke the Project Archive command and allows you to archive the current project. An archive should be made prior to running any of the utilities in this dialog box.

Compress Database will compact all the points and survey chains so that more space is available for new points and new chains to be imported into. Visual CAD will remove deleted points and deleted survey chains from the project. To check to see if your project will benefit when compressed, check ***Tools=>Summary=>Survey Data*** and see how many points and chains are in the project and how many are used.

Re-Compute Next Available Database Prefixes button recomputes the next available number for all prefixes of database objects. The next available number is the largest number for the prefix+1. This command functions similarly to the ***Tools=>Edit Database Prefixes*** command except that it requires no prompts from the user.

Expand Survey Database allows you to modify the maximum number of points and maximum number of survey chains in a project. Users having trouble viewing points or survey chains may need to check if they have exceeded the initial maximums set when the project was created.

Skip this dialog, if selected on, will not display this dialog when CAiCE starts up or when a project is activated.

GETTING AROUND

THE CAICE USER INTERFACE

An application window frame is displayed within CAiCE that holds the four main interface components: the **Pull Down Menus**, **Global Toolbars**, the **View Window Area**, and a **Status Bar**. Other components include Current Project/application title bar, View Windows and their toolbars, Explorer Center/Snap Bar, and the Text Window. The main window area normally contains one or more view windows in which data is displayed.

Typical components in a CAiCE window are displayed below.

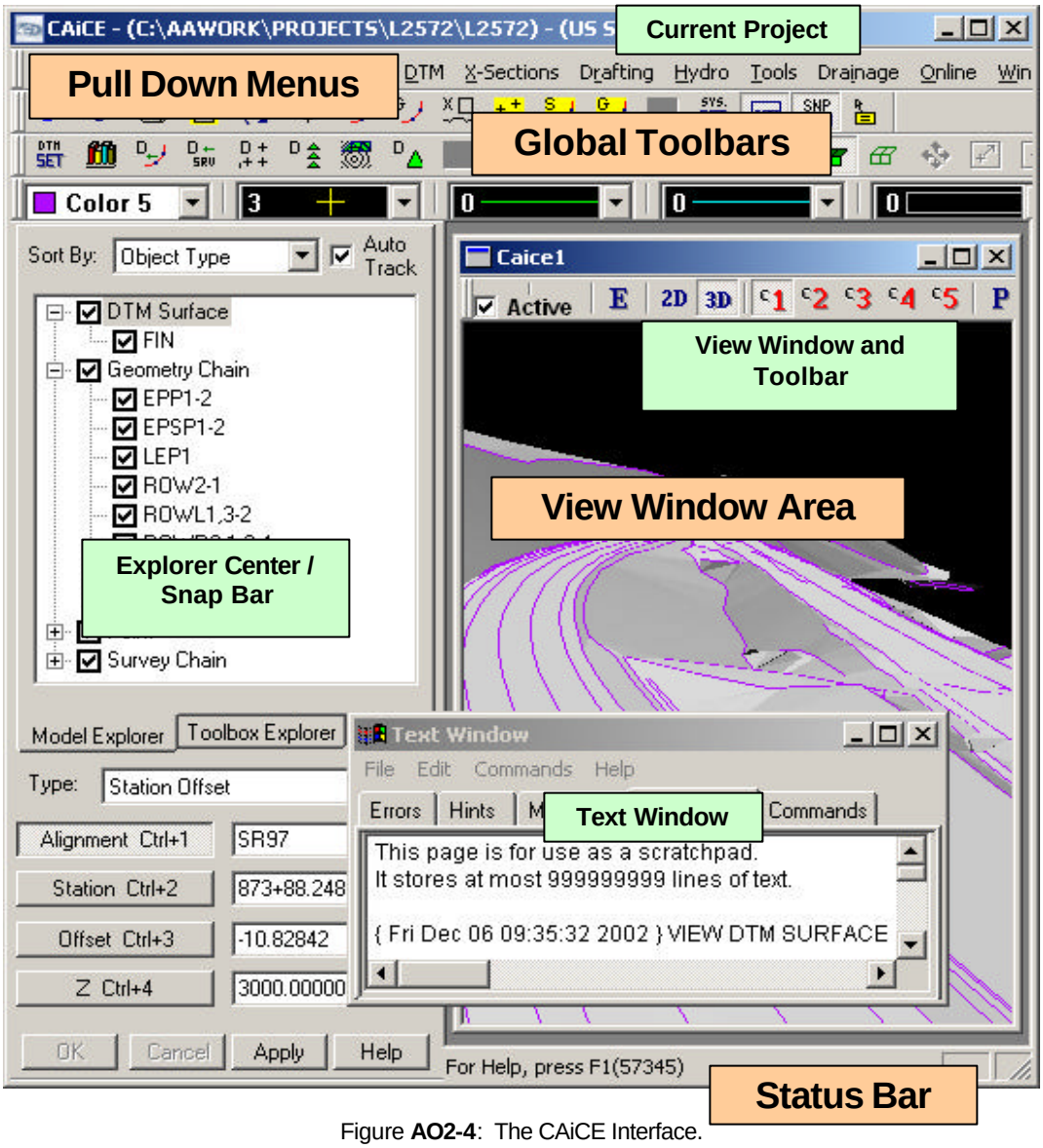

Figure **AO2-4**: The CAiCE Interface.

PULL-DOWN MENUS

One of the methods for selecting CAiCE commands is through the pull-down menu system. The next few pages give a brief description of the capabilities found on each pull-down menu.

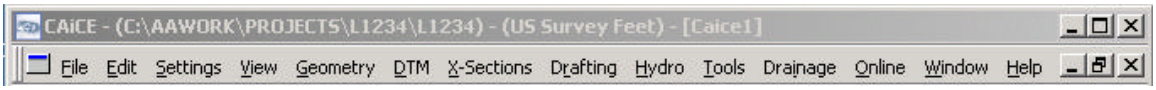

Figure **AO2-5**: CAiCE pull down menu selections.

File — Includes the project manager, format translators, data import and export utilities, report editing, and printing functions.

Edit — Contains standard Windows Clipboard commands for Cut, Copy, and Paste. It also includes a command for undoing and redoing View command graphics.

Settings — Includes commands that control how things are displayed, described, and behave in CAiCE. These include commands for defining, saving, and restoring all of the system settings, global and view option settings, object display settings, and drawing sheet format settings.

View — Contains all of the commands for viewing database objects in the view windows. The View Controls sub-menu also has commands for panning, zooming, navigation, and fitting graphics views.

Geometry — Storing, editing, computing, describing, deleting, listing, and annotating geometry objects are handled via this pull down menu. These operations are also known as Coordinate Geometry (COGO) functions. This menu also contains miscellaneous reports commands, including station-offset and inversing commands.

DTM — Digital terrain modeling operations. This menu includes commands for creating, managing, loading, and editing DTM surface databases, building DTM triangles, contours, and grids, merging and clipping DTM's, and site design grading.

X-Sections — All of the commands dealing with creating, editing, deleting, and reporting cross section files are found here. This menu includes access to the roadway design system in CAiCE Visual Roads.

Drafting — Provides labeling and drafting commands. These include commands for freehand drawing of lines and cells, labeling computed inverses and, angles, storing, editing, and deleting text elements, drawing tables of geometry information, and defining sheet windows for drawing production.

Hydro	Contains utilities for stormshed and wastewater network development and management. This utility is currently not available at WSDOT as our Hydrology department uses specific, established tools for state work.
Tools	Contains miscellaneous commands. There are commands for attaching files to a project, including feature tables, cell library, earthwork class tables and command tables. There are also database manipulation utilities, coordinate transformations and tools to measure distance and position. Macros can be accessed and recorded from this menu, and the drive-through controls are available for graphics animation.
Drainage	Contains tools to integrate drainage into roadway design process including Drainage Manager, Culvert Analysis, and Water catchment areas.
Online	Provides a way of using the Internet within CAiCE. With these menu options, you can open web browser pages as special view windows in CAiCE. Just like normal graphical view windows, these windows can be resized, tiled, minimized, and closed.
Window	Contains standard utilities for creating, sizing, and positioning windows within CAiCE. There are also commands for turning various palettes, toolbars, and windows on or off.
Help	Accesses the on-line help system.

TOOLBARS

A toolbar is a collection of icon buttons that point to specific commands in CAiCE. Consider them shortcuts to the pull down menus. When browsing the pull down menus, note that many selections show icons to the left of the command name. These icons can be referenced to create a custom toolbar for quick access to related or frequently used commands.

CAiCE has two types of toolbars:

- Those that are fixed and cannot be changed
- Those that can be created and customized by the user.

Examples of fixed toolbars include the Global toolbars (current color, symbol, line style, etc.), the View toolbar that is attached to each view window, the Drivethrough controls, the Snap bar, and the Measure bar.

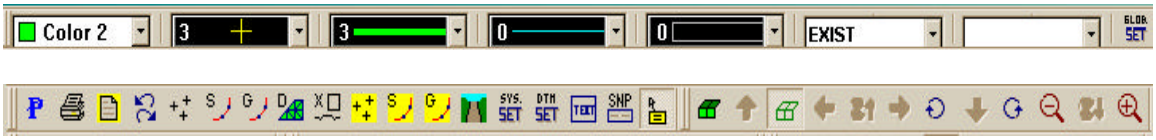

Figure **AO2-6**: Fixed toolbars in CAiCE.

Fixed toolbars can be undocked, relocated, and resized. You will also find options to turn them on or off under the **Windows** pull down menu. All user-defined toolbars are saved in the registry when CAiCE exits and are restored when CAiCE is next launched.

Custom toolbars can be created and stored by the user. WSDOT has a complete set of toolbars that are task oriented. These toolbars can be loaded the first time you log in to the machine.

Toolbars are user profile specific. If you set up a collection of custom toolbars on your machine and allow your co-worker to log on to the same machine, they will not get the same toolbars. Contact your CAE Coordinator for information on saving toolbars and transferring them to other users.

MANAGING TOOLBARS

Viewing all the available toolbars certainly brings the typical tools within easy reach. However, too many toolbars clutters the workspace and minimizes your view window area. It is highly recommended that you view only the toolbars that you need for the task you are attempting to perform. This maximizes the effective workspace and keeps the search for a particular toolbar button down to a reasonable time.

To manage your toolbars, use any of these methods:

1. Select the ***Settings*** => ***Toolbars*** command, which displays the Toolbars Manager dialog box. With this command you can select which toolbars to display or hide, as well as create new toolbars, select and modify the commands that are available on each toolbar, delete a toolbar, and change the name of a toolbar.

2. Select this command by placing the cursor anywhere on the Toolbar window frame and click the right mouse button. This displays a shortcut menu that allows you to show or hide toolbars and includes a **Toolbars…** option to use the Toolbars Manager.

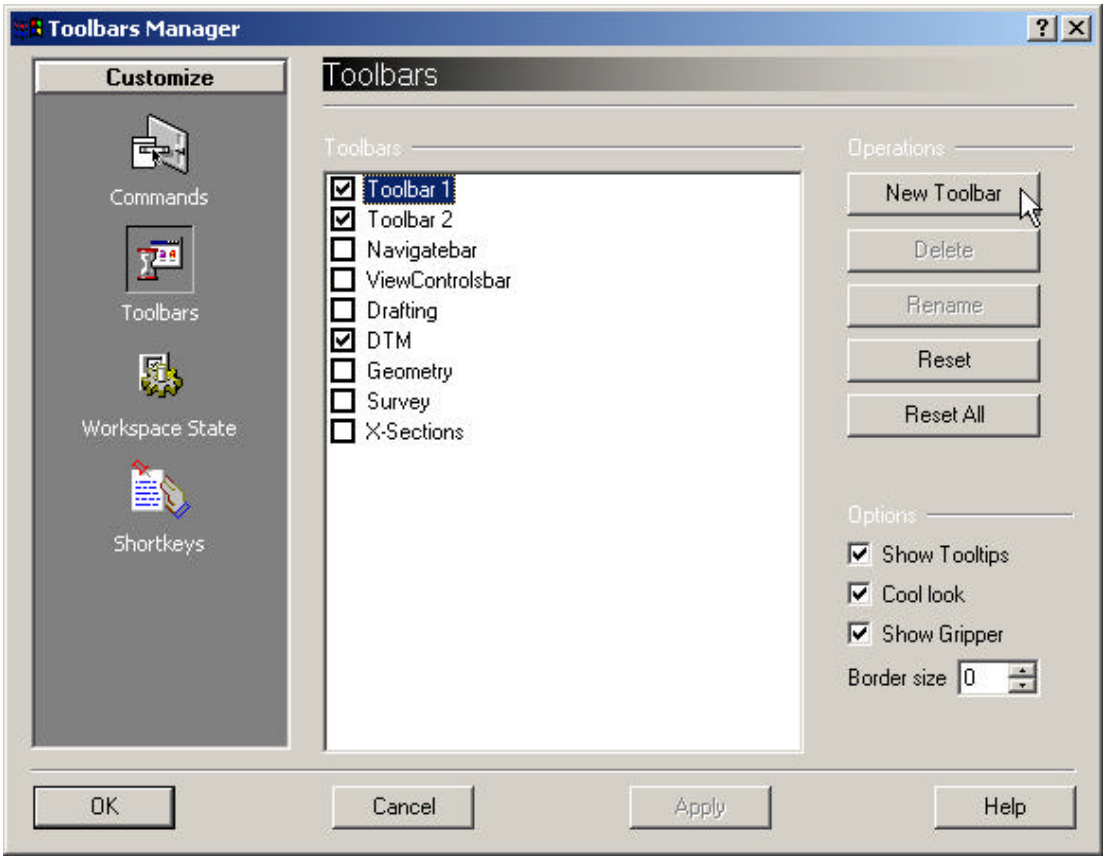

Figure **AO2-7**: The Toolbars Manager dialog.

There are different toolbar editing operations that can be performed using the Toolbars Manager. Some affect only the appearance of the toolbar, and others actually change its content. In the Toolbars section of the Toolbar Manager dialog box there is a section labeled **Options**.

To create a custom toolbar, click on New Toolbar in the Operations area. Then, in the left column, select Commands. This provides a complete listing of CAiCE commands. Left click and drag commands into the new toolbar.

Note: It is highly recommended that you clear the WSDOT custom toolbars prior to creating your own. Contact your CAE Coordinator for information on clearing and loading toolbars.

Appearance options include the following:

1. **Show Tooltips -** Turning this on enables tooltips, which displays a description of a button when you rest the cursor on top of it.

2. **Cool Look -** This changes the appearance of the buttons and menu items to the style standardized in the Microsoft Office 2000 products. Turning it off gives them a more “button” look.

3. **Show Gripper -** This turns on the double vertical bars on docked toolbars. The gripper must be displayed to relocate a docked toolbar.

CAiCE also provides a quick reference, or shortcut menu that includes what CAiCE views as the most commonly used commands.

Placing the cursor over a view window and right clicking the mouse will display the shortcut menu. This menu is sensitive to the type of view window that is currently active. The figure below shows the right mouse button menus for 2-D/3-D view windows. They are divided into groups.

The first command on the shortcut menus is typically the last command executed for that window type, however, many commands such as Zoom In and Zoom Out are not saved as the last command given.

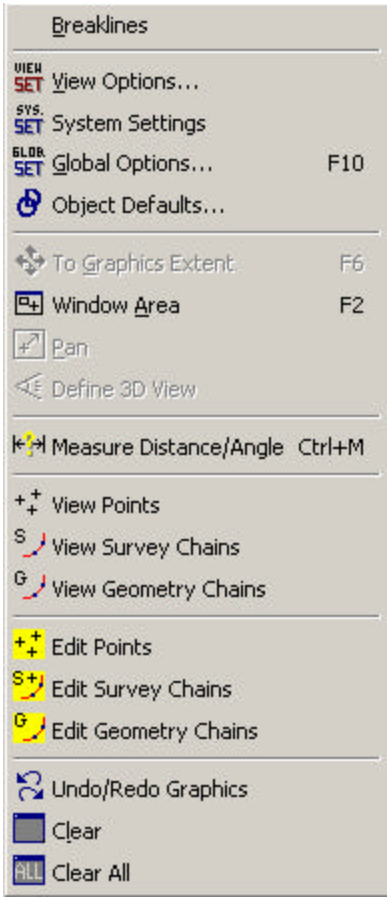

Figure **AO2-8**: The Shortcut Menu for 2D/3D view window commands

MAIN WINDOW AREA

In CAiCE, view windows display various portions of the CAiCE database and cross-sections. You can have several views visible at once, for example, a plan view of survey data, a plan view of a design profile, a three-dimensional perspective view of the database and a cross-section view.

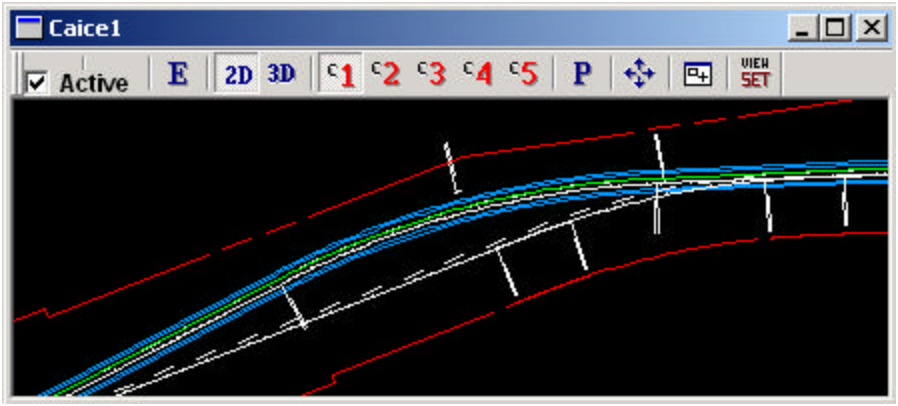

Figure **AO2-9**: A CAiCE view window.

View windows are made up of two parts:

1. The window frame, which contains the title bar, and toolbar
2. The view itself.

CAiCE displays one view window by default. Use the **Window** pull down menu to open and manage new windows. The size and position of view windows are controlled by the standard Windows commands for sizing, maximizing, restoring, tiling and cascading.

At any given time, a single view is considered the **current** view and the title bar for that view is highlighted. To make a view current, left click in the view, or select the window name from the Window menu. All other view window title bars will gray out to indicate they are not current.

Some view control commands affect the current view only. If you zoom in or out, it will zoom the current view only. If you select the ***View=>Clear*** command, it will clear the contents of the current view only. If you select the ***View*** => ***Clear All*** command, all view windows will clear.

The current view also controls which pull down menu set is available. When a plan view is current, the standard pull down menu is available. When a cross-section view is current, the pull down menu changes to include specific command selections for cross-section tasks.

The **Active** checkbox in the toolbar at the top of each view window determines whether that view is active or inactive for drawing. When a view is active, all **View** commands which draw objects in plan or 3-D views produce graphics in that window. If you wish to draw objects in some views but not others, make the views you do not want to draw in "inactive" by turning off their **Active** check box.

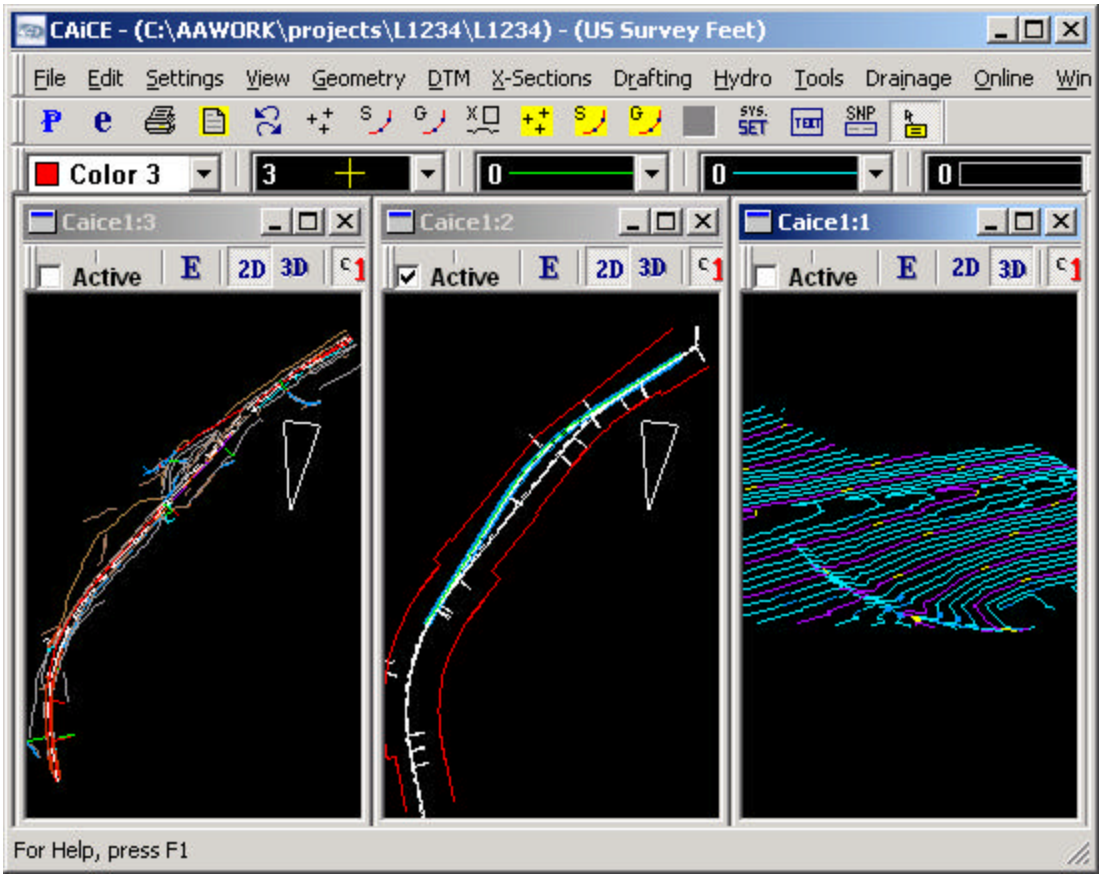

Figure **AO2-10**: Multiple views in the view window area.

The figure above shows three views: CAiCE1:1 shows survey information. CAiCE1:2 shows alignment and other design elements without survey. CAiCE1:3 is a 3D view of DTM contours. Note which view is active. Any object view commands in this configuration would apply to CAiCE1:2 only.

Which one is the current view? Note the triangles in views CAiCE1:1 and CAiCE1:2. These triangles indicate where the current view is looking in relationship to each of the other views.

You can make a view current by clicking anywhere in that window, or by selecting the window name from the Window menu.

THE STATUS BAR

The status bar is like a message center that CAiCE uses to inform you about the status of the current operation. It is located in the **lower left** portion of the CAiCE application window. From "For Help, press F1", to "No Valid Feature Table Attached!", the status bar is utilized with most commands and functions.

When CAiCE is expecting you to do something, a message like "drag a rectangle…" will appear to help you with the command. During importing of data, or developing a 3D Digital Terrain Model, the status bar will indicate how many objects have been read or written, or what percentage of a process has been completed.

OTHER SESSION ELEMENTS

Along with the main components of the CAiCE window, below are a few features that are worth noting.

CURRENT PROJECT/APPLICATION TITLE BAR

At the top of the CAiCE application window is the application title bar. Almost all Windows compatible applications have this bar, but CAiCE utilizes it to display the currently active project (and database), it's location or path, and the project units. When a view is maximized, the view number will also appear in the application title bar.

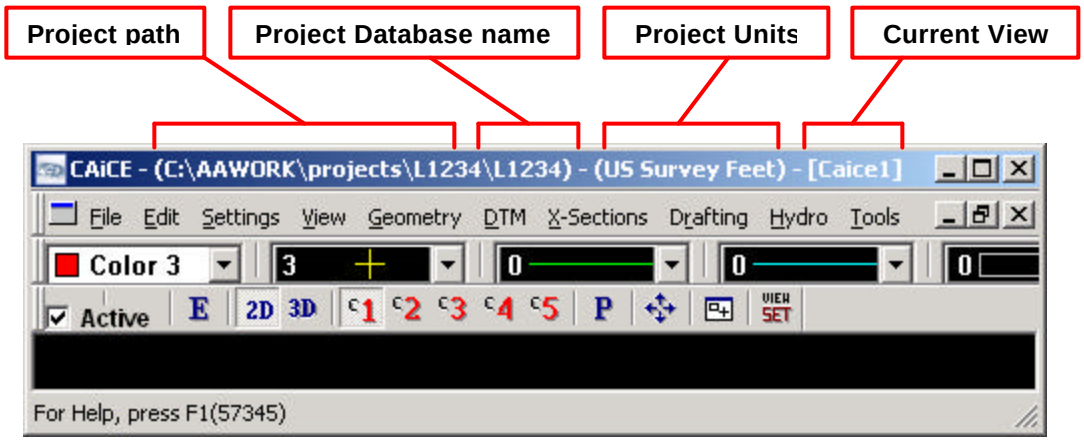

Figure **AO2-11**: The application title bar is a good reference to tell which project you are working in.

EXPLORER CENTER / SNAP BAR

The Explorer Center / Snap Bar consists of two tools; the ***Explorer Center*** and the ***Snap Bar***.

The toolbar can be toggled on or off by selecting the command **Window=>Explorer Center/Snap Bar**. As you can see in the figure below, the **Explorer Center** is the upper portion of this toolbar, and the **Snap Bar** is the lower.

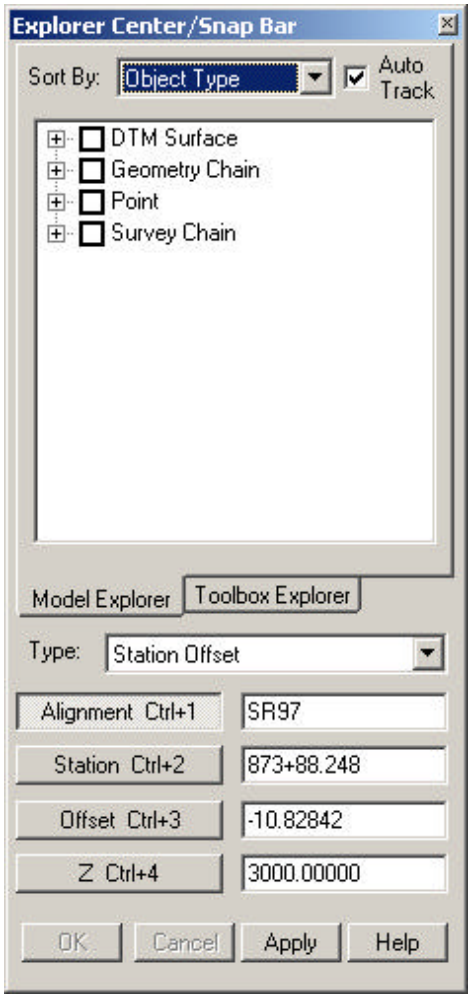

Figure **AO2-12**: CAiCE's Explorer Center / Snap Bar.

The **Explorer Center** consists of two explorers.

The **Model Explorer** lets you browse through information drawn in the active view window, refresh objects, highlight them, erase them from the screen (but NOT from the database), and redraw them using halftone or background graphics.

TECH TIP: If you have used CDG graphic files to save or restore views, this is a much more effective alternative. Not only does it maintain the same amount of information at a fraction of the file size, it allows selective element viewing and graphic manipulation.

The **Toolbox Explorer** provides a way of accessing and managing software extensions or tools. Some toolboxes contain a set of macros specific to an involved task, such as street intersection design. Other toolboxes are collections of tools developed by WSDOT and other agencies that make our unique approach to key processes more automated and effective.

The **Snap Bar** can display coordinates, station-and-offset, distance and direction from a point, and several other options. This utility serves two purposes. First, whenever your cursor is within a view window the Snap Bar displays the current position of the cursor. Second, the Snap Bar can be used to set the cursor location for certain on-screen digitizing operations.

The appearance of the Snap Bar depends on which "Type:" of snap is currently selected.

The Snap Bar serves two purposes:

1. Whenever your cursor is within a view window the Snap Bar displays the current position of the cursor.

2. The Snap Bar can be used to set the cursor location for on-screen digitizing operations.

USING THE SNAP BAR FOR DISPLAYING CURSOR POSITIONS

This cursor position can be displayed in several different ways, depending on which type of mode has been selected. These modes include:

Point Name	This mode displays the name of any stored point that the cursor passes over. The point must be viewed and visible and on the active view window.
Station Offset	This mode displays the station and offset of the cursor relative to a geometry chain.
XY Pair	This mode displays the X, Y, and Z coordinates of the cursor as it moves. The Z is determined from the cursor position on the current active DTM surface
Northing/Easting Pair	This mode also displays the cursor coordinates, but in Northing – Easting order.
Locate from Point	This mode displays the distance and direction of the cursor relative to a point.
Point of Curvature **Point of Tangency** **Point of Intersection** **Center of Curvature**	For these modes, a curve name is displayed any time the cursor passes over a stored curve that is displayed on the view window.
Profile Window Coordinates	This mode provides station and elevation for profile points.

THE TEXT DISPLAY WINDOW

CAiCE has a dedicated text display window, which logs messages to the user. Messages are categorized into several different pages within the window: errors, hints, messages, scratchpad, and commands. Each page has the capabilities of a miniature text editor, so you may cut, copy, paste, perform text searches, save to a file, and print any page contents.

Figure **AO2-13**: The Text Display Window

The errors, hints, and messages pages log different types of information messages. The scratchpad window records each command as it is executed. It also provides a place where you can paste any text you might want to save for later review.

The command window is special: any lines that are typed into this window are executed by the command system. You can also send text from any window to the command system by highlighting the text and choosing **Execute Selection** from the Command menu. You can access the command table by selecting the ***Tools*** => ***Attach*** => ***Command Table***.

There are several ways to change the appearance of the Text Window:

1. You can minimize the text display window by selecting Minimize from the File menu.

2. You may hide the text display window by selecting Close from the system menu on the window frame.

3. Since screen space is often at a premium, you can hide the menu by un-checking the Show menu check box.

In either case, all messages continue to be logged, and can be reviewed by restoring the window to normal visibility.

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CHAPTERS 1 & 2 EXERCISES

1. CAiCE is geared toward what type of design work?

2. Of the list on page AO-4, which module might you use to learn about bringing MicroStation data into CAiCE?

3. In CAiCE, select **DTM => DTM Database Manager** and use the **"What's this"** feature to find out what the *Max. Triangle Distance* field is for.

4. Select **View => Points**, select the **Help** button to get an overview of this dialog.

5. Select **Tools => Custom Tools => CAiCE On-line Manual**, click on the Visual CAD section and browse the topics.

6. Select **Tools => Custom Tools => WSDOT CAE Homepage** to access our website. Select **CAiCE**. In the left navigation bar, select **Training** to see all the classes available through WSDOT CAE Support.

CHAPTERS 1 & 2 ANSWERS

1. CAiCE is geared toward **Civil Engineering Roadway** design work.

2. You would look in the **Data Import / Export module** to find information on bringing MicroStation data into CAiCE?

3. In CAiCE, select **DTM => DTM Database Manager**, right-click on the *Max. Triangle Distance* field. Select the **"What's this"** feature. A display window will appear describing the field and what it is used for.

4. The Help system in CAiCE covers most every dialog box. Once in the help window for the **View Points** dialog, you can search for keywords or browse the index for any feature or command in CAiCE.

5. The **CAiCE On-line Manual** is an Adobe PDF format document. It will open using Adobe Acrobat reader. You can use Acrobat features to enhance your searches to look in the current document or across many documents.

6. The Training web page includes all the currently available CAiCE classes along with their prerequisites, descriptions, objectives, and schedules. Also available are downloadable data sets and manuals for self-paced study at your workstation.

Chapter

3

Working in CAiCE

OVERVIEW

CAiCE organizes data by project. For each separate job you do with CAiCE, you must first use the Project Management System to create a project for that job. Creating a project sets up a specific directory for the project and initializes files for the project data tables, settings, and defaults.

Project creation and management are discussed in more detail in the **WSDOT CAiCE Projects** module.

PROJECT DATABASE

Each project has a database that contains all the geometric objects stored within the project. This database includes information such as object names, descriptions, characteristics and attributes, annotations, coordinate values, associated supporting elements, etc.

More project database information can be found in the **WSDOT CAiCE Projects** and **COordinate GeOmetry (COGO)** modules.

SEGMENTS

Segments are created to hold and isolate survey datasets from the project database while processing. When a segment is created, a subfolder of the same name is created. There, survey data can be imported and processed without inadvertently impacting information already in the project database.

Once in the project database, survey information can be called up and manipulated based on the segment name they are associated with.

Photogrammetry is also imported into the WSDOT CAiCE project via segments.

Segments are described further in the **WSDOT CAiCE Projects** and **Survey Data Processing** modules.

DTM DATABASES

Digital Terrain Models (DTMs) are also isolated in CAiCE. When creating a DTM surface, CAiCE initiates a separate database containing only information about the DTM. This database consists of a number of files depending on what state the surface is in and what features have been developed from it.

When developed from survey information, the DTM database makes a copy of every element used to maintain and manipulate separately.

More information on DTM databases can be found in the **Digital Terrain Models** and **Survey Data Processing** modules

OTHER FILES AND TABLES

Other types of files and tables can be accessed by a project.

There are elements of a design project that are not part of the project database, segments, or DTM databases but are found in the project directory, such as documentation files, terrain profiles, cross-sections, roadway templates, settings files, and other user developed project specific resources.

Resource files and tables are not part of the project database, but are independent files that can be attached to any number of different projects. These allow design consistency across all design projects throughout the state. Also, there are tables and reference files that reflect the design requirements set by State and Federal publications.

Resource files are discussed in the **WSDOT CAiCE Project** and **WSDOT Resources** modules as well as other modules covering specific processes dependent on these files.

Challenges

1. CAiCE is our _____ _____ application and MicroStation is our _____ application.
2. Which three disciplines primarily use CAiCE in WSDOT?
3. How many sessions of CAiCE can you have open at the same time?
4. Where would you go in CAiCE to display a curve?
5. How can you tell if a view is active?
6. How can you quickly access the last CAiCE command?
7. How can you execute commands in the Text Display window?
8. List three data management components in a CAiCE project.

ANSWERS:

1. CAiCE is our **Roadway Design** application and MicroStation is our **Drafting** application. Pg. AO-1

2. Our **Survey**, **Design**, and **Construction** disciplines use CAiCE in WSDOT. Pg. AO-2

3. It is possible to open more than one instance of CAiCE. However, **CAiCE will not function effectively with multiple instances of the application open**. Pg. AO-8

4. To display a curve, **select View => Geometry => Curves**, select the curve object you wish to view.

5. To tell if a view is active, **verify that the active checkbox found in the upper left corner is checked on**.

6. Quickly access the last CAiCE command **by using the Shortcut menu. Right-click in the graphics display area and choose the top selection**.

7. Execute commands in the Text Display window **by attaching a command table through Tools => Attach => Command Table, then highlight the command in the text window and select Command => Execute**.

8. 3 data management components in a CAiCE project are **the Project Database, Segments, and the DTM Database**.

Summary

APPLICATION OVERVIEW

CAiCE is a 32-bit Windows compatible application that includes several integrated "Visual" modules, including CAD, survey, coordinate geometry, site design tools and roadway design. WSDOT first implemented CAiCE in 1997.

There are nine basic design aspects in a typical WSDOT CAiCE project. WSDOT CAE has developed custom resources and startup utilities. These support resources ensure that WSDOT standards and conventions are maintained and that users are kept up-to-date and can customize the CAiCE environment they work in.

There is a multi-leveled support structure to help CAiCE users get effective help in a timely manner. The support levels include local application help utilities and resources, a WSDOT CAE Support website, training, and dedicated support personnel.

CAiCE contains a main application window, for the menus, toolbars etc., and uses the standard Windows menu structure, and includes thirteen menu pull-downs. CAiCE has two types of toolbars – fixed and customizable. The CAiCE interface also includes a Text Display window to log messages and process commands and a Snap Bar displays several cursor positions, and can be used for on-screen digitizing operations.

CAiCE operates in a project-based environment. Each project contains a project database. Other key components are Segments and DTM databases. Other files can be stored in the project directory or referenced from the standard WSDOT resources to provide consistency and standardization.